Attachment III

Staff's Cost Analysis and Conclusions for Potentially Modifying the De Minimis Fleet Visits Criteria from an Individual Port Basis to a Statewide Basis

Summary

At its public hearing on December 6, 2007, the Air Resources Board (the Board or ARB) adopted the "Regulation to Reduce Emissions from Diesel Auxiliary Engines on Ocean-Going Vessels While At-Berth at a California Port," with modifications. In adopting the regulation, the Board directed staff to consider amending the de minimis visit criteria of the regulation, pending an economic analysis, the results of which would be included in the 15-day package for public comment.

Staff had proposed to exempt from the requirements of the regulation container-ship fleets making less than 25 visits to a California port, refrigerated-cargo-ship fleets making less than 25 visits to a port, and passenger-ship fleets making less than five visits to a port. The Board expressed its intent to modify these de minimis values to apply on a statewide basis, not an individual port basis, but directed staff to determine if this proposed modification would be cost effective.

Staff conducted an economic analysis of modifying the de minimis visit criteria to a statewide basis and determined the following:

- As adopted, the regulation captures 96 percent of the vessel visits for the three ship categories, and reduces NOx and PM emissions by an estimated 75 percent in 2020.

- If the regulation were modified using statewide de minimis visit criteria, less than one percent of vessel visits would be additionally affected, resulting in less than one percent additional NOx and PM reductions.

- The cost of capturing these additional vessels and visits would result in cost-effectiveness values that would be up to 20 times higher than the average value of the adopted regulation.

- Therefore, staff recommends that the originally proposed de minimis visit criteria be maintained on an individual port basis.

A discussion of the analysis follows.

Analysis

The hotelling emission reduction regulation affects vessel fleets visiting the Ports of Los Angeles, Long Beach, Oakland, San Diego, San Francisco, and Hueneme. A vessel fleet is comprised of ships that are owned and operated, or chartered, by a shipping company. Furthermore, a fleet is port-specific, so a company can have several California fleets. For example, a cruise line than visits the Port of San Francisco has a San Francisco fleet. That same cruise line may call on the Port of San Diego, so it also has a San Diego fleet. Some of these fleets may even share some of the same ships. The intent of the regulation is to require a shipping company to reduce emissions at every port it visits, assuming it exceeds the de minimis visit criteria for those individual ports. Because of their close proximity—and that it is not uncommon for container-ship companies to call on both ports—the Ports of Los Angeles and Long Beach are considered one port for the purpose of this regulation.

Statewide de minimis visit criteria would affect one container-ship fleet, five passenger-ship fleets, and two refrigerated-cargo-ship fleets. (See Attachments A - D for fleet details.) Table 1 illustrates the number of additional vessel visits that would be affected using statewide criteria instead of individual port criteria for the three ship categories subject to the regulation. The number of additional visits represents less than one percent of the total California visits.

Category	Total Visits to State	Affected Visits (Port-Specific Basis)	Percent of Total Visits	Additional Visits Affected (Statewide Basis)	Percent of Total Visits
Container	4,890	4,785	97.9	13	98.1
Passenger	699	664	95.0	12	96.7
Refrigerated Cargo	299	203	67.9	20	74.6
Total	**5,888**	**5,652**	**96.0**	**45**	**96.8**

Table 1 – Visit Impact of Statewide Criteria (2006 Data)

The most significant impact would be in the refrigerated-cargo-ship category, where a company that does almost all of its business at the Port of Hueneme importing bananas—and whose fleet at this port would already be subject to the regulation—would also be required to use shore power (or its equivalent) for its fleets at the Ports of Los Angeles and San Diego. The vessels calling at the Port of Los Angeles visit the port only a portion of the year and carry seasonal fruit. The occasional vessels calling at the Port of San Diego (four visits in 2006) carry bananas. The visits to these two ports are not cost-effective to capture. (See Attachment D.)

The statewide de minimis visit criteria would affect five passenger-ship fleets. The affected ships are infrequent visitors to California ports, such as ships

relocating from the Caribbean to Seattle for the Alaska cruise season. The statewide criteria would also affect a container-ship company whose fleet to the Port of Los Angeles/Long Beach is already subject to the regulation. This company's fleet at the Port of Oakland (whose vessels made 13 visits to Oakland in 2006) would now be subject to the regulation. As was the case with the refrigerated-cargo-ship category, these additional passenger-ship and container-ship fleets are not cost-effective to capture. (See Attachment D.)

The additional emission reductions resulting from a statewide fleet de minimis visit criteria would result in minimal additional emission reductions—less than half of one percent of the reductions expected from the existing regulation, as shown in Table 2 below.

Pollutant	Estimated Emissions (TPD)	Emissions Reduced (Port-Specific Basis) (TPD)	Percent of Emissions Reduced	Additional Emissions Reduced (Statewide Basis) (TPD)	Percent Emissions Reduced
NOx	37.3	27.8	74.5	0.08	74.7
PM	0.67	0.50	74.6	0.002	74.9

Table 2 – Emissions Reduction Impact of Statewide Criteria (2006 Data)

Because the estimated emission reduction benefits would be small, and the ships that would be affected are infrequent visitors to California, the cost-effectiveness of amending the visit criteria of the regulation from an individual port basis to a statewide basis is significantly higher, as Table 3 below illustrates. The incremental cost for the eight additional fleets (and their 45 visits) is six to 20 times the overall cost of the shore power regulation for NOx reductions, and four to 11 times for PM. Attachment D presents the cost-effectiveness values for the eight fleets affected by the potential criteria modification.

Table 3 - Cost Effectiveness of Statewide Criteria (2006 Data)

Category	NOx Cost Effectiveness of Additional Captured Fleets ($/ton)	PM Cost Effectiveness of Additional Captured Fleets ($/ton)
Container	$200,000	$7.4 million
Passenger	$82,000 - $230,000	$2.8 - $7.9 million
Refrigerated Cargo	$120,000-$220,000	$4.1-$7.9 million
Adopted Regulation	**$12,800**	**$0.69 million**

Recommendation

Based on the high cost-effectiveness values determined for those fleets that would be affected by a statewide de minimis visit criteria and the small amount of emission reductions that can be generated, staff recommends that the visit criteria be based upon individual port visits, as originally proposed.

They are:

(1) A container-ship or refrigerated-cargo-ship fleet is subject to the requirements of the regulation if the fleet makes 25 or more visits to a California port; and

(2) A passenger-ship fleet is subject to the requirements of the regulation if the fleet makes 5 or more visits to a California port.

Staff had considered a two-tiered approach for vessel visits—a port-specific criteria (25 visits) and a larger statewide criteria (40 visits)—but the potential impact would be similar: vessels making few visits to a port becoming subject to the rule, resulting in high costs for minimal benefits.

Staff will monitor the vessel data in the fleets' annual compliance statements and the ports' wharfinger data to determine if fleets are modifying their operations to stay below the de minimis visit criteria. If, during the regulation's implementation, staff determines that vessel fleets appear to be circumventing the requirements of the regulation by manipulating their vessel visits to California ports, staff will consider proposing to the Board modifications to the regulation to prevent these practices in the future.

Attachment A: Container Fleets Affected by the At-Berth
Ocean-Going Vessel Regulation
(2006 Ship Data)

Below are container shipping companies that visited California ports in 2006 with each company's total visits to the port. Fleets above the bold lines are currently subject to the regulation based on the 25-visits-to-one-port de minimis limit. In addition, underlined fleets with less than 25 visits are also subject to the regulation because they are composed of shore-power-equipped vessels that are expected to visit berths at Oakland that are capable of providing shore power. The regulation requires these types of vessels to always connect to shore power if power is available at a berth where the ship is visiting. The fleet below the line and in bold (Company Q at Oakland) would be an additional fleet affected by the regulation if the de minimis visit criteria were modified to 25 statewide visits.

Operator	Total visits POLA/POLB 2006
Company A	369
Company B	253
Company C	231
Company D	222
Company E	205
Company F	183
Company G	169
Company H	140
Company I	127
Company J	125
Company K	113
Company L	113
Company M	100
Company N	95
Company O	87
Company P	83
Company Q	78
Company R	61
Company S	53
Company T	48
Company U	47
Company V	46
Company W	38
Company X	37
Company Y	21
Company Z	16
Company AA	12
Company BB	7
Company CC	6
Company DD	4
Company EE	4
Company FF	2
Company GG	2
Company HH	1
Company II	1
Company JJ	1

Operator	Total visits Oakland 2006
Company G	190
Company B	151
Company A	143
Company E	143
Company C	134
Company D	126
Company K	103
Company M	94
Company O	85
Company I	84
Company L	81
Company H	74
Company F	69
Company S	64
Company N	62
Company P	47
Company U	37
Company V	30
Company J	21
Company W	19
Company R	5
Company Q	**13**
Company AA	12
Company KK	3

Attachment B: Passenger Fleets Affected by the At-Berth
Ocean-Going Vessel Regulation
(2006 Ship Data)

Below are passenger companies that visited California ports in 2006 with each company's total visits to the port. Fleets above the bold lines are currently subject to the regulation based on the five-visits-to-one-port de minimis limit. In addition, the underlined fleet with fewer than five visits is also subject to the regulation because it is composed of shore-power-equipped vessels that are expected to visit berths at San Diego that are capable of providing shore power. The regulation requires these types of vessels to always connect to shore power if power is available at a berth where the ship is visiting. The fleets below the line and in bold (Companies G, J, and E at San Diego, and Companies D and J at San Francisco) would be additional fleets affected by the regulation if the de minimis visit criteria were modified to five statewide visits.

Operator	Total visits San Diego 2006
Company A	57
Company D	51
Company B	28
Company F	19
Company C	17
Company I	3
Company K	3
Company G	**2**
Company J	**2**
Company L	2
Company M	2
Company E	**1**
Company N	1
Company O	1
Company P	1
Company Q	1
Company R	1
Company S	1

Operator	Total visits San Francisco 2006
Company C	42
Company F	11
Company E	7
Company A	5
Company D	**4**
Company J	**3**
Company I	1
Company P	1
Company Q	1
Company T	1
Company U	1
Company V	1
Company W	1
Company X	1

Operator	Total visits POLA/POLB 2006
Company B	153
Company A	140
Company C	52
Company E	37
Company G	13
Company H	13
Company F	8
Company I	8
Company Y	1
Company Z	1

Attachment C: Refrigerated Cargo Fleets Affected by the At-Berth Ocean-Going Vessel Regulation
(2006 Ship Data)

Below are refrigerated cargo shipping companies that visited California ports in 2006 with each company's total visits to the port. Fleets above the bold lines are currently subject to the regulation based on the 25-visits-to-one-port de minimis limit. (No refrigerated cargo companies are affected at POLA/POLB.) Fleets below the lines and in bold (Company A at POLA/POLB and San Diego) would be additional fleets affected by the regulation if the de minimis visit criteria were modified to 25 statewide visits.

Operator	Total visits Hueneme 2006	Operator	Total visits POLA/POLB 2006	Operator	Total visits San Diego 2006
Company A	103	**Company A**	**16**	Company C	48
Company B	52	Company E	15	Company D	16
Company D	1	Company F	12	Company G	11
Company G	1	Company I	3	Company H	9
		Company H	4	**Company A**	**4**
		Company L	1	Company J	2
				Company K	1

Attachment D: Cost Effectiveness for Affected Fleets if De Minimis Visits Criteria Changed from Port Visits to Statewide Visits

Ship type	Companies affected	Port	Cost effectiveness NOX (dollars per ton NOX reduced)	Cost effectiveness PM (million dollars per ton PM reduced)	Number of ships affected	Berth times (hr/visit)	Number of ships equipped with shore power equipment	Total number of visits	Average visits per ship
Cost Effectiveness For Case Where Shore Power Equipment Must Be Added to Both the Ship and the Shore[1]									
Refrigerated Cargo	Refrigerated Cargo Company A	POLA	$220,000	$7.9	11	45	1	16	1.5
Cost Effectiveness For Case Where Shore Power Equipment Is Only Added To The Ship[2]									
Container	Container Company Q	Oakland	$200,000	$7.4	8	20	1	13	1.6
Passenger	Cruise Line G	POSD	$230,000	$7.9	2	10		2	1.0
Passenger	Cruise Line E	POSD	$230,000	$7.9	1	10		1	1.0
Passenger	Cruise Line J	POSD	$145,000	$5.0	2	10		2	1.0
Passenger	Cruise Line D	POSF	$151,000	$5.2	3	10	1	4	1.3
Passenger	Cruise Line J	POSF	$82,000	$2.8	1	10		3	3.0
Refrigerated Cargo	Refrigerated Cargo Company A	POSD	$120,000	$4.1	3	87		4	1.3

Footnotes:

1 Statewide fleet criteria would require: 1) shore power equipment be added to the appropriate ships in this fleet; and 2) shore power equipment added to the shore-side infrastructure. In this case, there is both ship-side and shore-side costs.

2 Statewide fleet criteria would require shore power equipment be added to the appropriate ships in the fleet to satisfy the requirements of the regulation. Since these fleets already visit terminals with shore power capability, there is no additional cost associated with adding shore-side infrastructure.